

Crop Nutrition in Tudor and Early Stuart England

By G. E. FUSSELL

RECORDS of actual farming practice in Tudor and Stuart England are scanty. A few farm accounts and diaries describe the day-to-day activities of their writers. The number of such writings as yet printed or recorded is small, though there is every promise that many more may be found by local archivists. Their evidence can only be indications of what may have been done more widely than on the particular farm, or in the locality where the farmer lived. Something, too, can be indirectly gained from the inventories attached to contemporary wills or from court rolls that sometimes lay down rules for the management of the manorial lands, but necessarily little about the use of manure.¹ Contemporary didactic textbooks on farming are at present the most direct source of information. These make little or no reference to theory. If there can be said to have been any theory, it is confined to authoritative assertions, unsupported by any experimental evidence until the beginning of the seventeenth century, when Sir Hugh Plat, Francis Bacon, and Gabriel Plattes made the earliest attempts to combine science with practice.

Textbook evidence must be used with caution. It is now difficult, if not impossible, to decide whether the systems the books recommend were actually practised, and, if so, by what proportion of the farmers. Often the teaching is derived from classical sources, as might be expected, and serves to indicate the continuity of farming ideas during many centuries. They may not have been the actual practice at all, or only in limited areas and on particular farms. Only when a writer states that some practice was customary in a named place is it certain that some farmers actually worked in that way.

The fertilizing resources of the Tudor husbandman were strictly limited. Animal excrement, vegetable waste, and the mixing of soils made up the complete list of his manures. The use of these materials had been common practice for centuries. The Greeks believed that the use of dung as a fertilizer originated in the labours of Hercules when cleansing the Augean stables.

¹ G. E. Fussell and V. G. Atwater, 'Farmers' Goods and Chattels', *History*, N.S. xx, 1935, pp. 117-23; W. G. Hoskins, *Essays in Leicestershire History*, Liverpool, 1950, pp. 123-83.

Later Columella expressed the opinion that manure was the thing of greatest value to the farmer and ought to be studied with the utmost care. The ancient authors on whom he relied had not altogether neglected it, but had discussed the subject with little elaboration.¹ As much or as little could be said for the intervening centuries.

Supplies of dung were very scanty in the early sixteenth century. The livestock were poorly fed and spent much of their time at open range on the common waste, where a good deal of the excrement was voided and so lost to the individual farmer. A small supply was accumulated when the beasts and horses were stabled for the night, or kept in houses or stalls during the winter. This was so exiguous that it was considered good practice to mix it with fresh earth. The crop nutrients did not then get buried so deeply in the soil as to be wasted. It would lie close to the seed as it ought. The sheepcote, too, must be cleaned out every fourteen days and the muck mixed with earth, clay, or ditch mud. Straw or chaff should also be mixed in the heap, and if any could be spared from animal feeding, it should be put in the sheepcote where it could be trodden and mixed with droppings and urine and rot down. Both cowstall dung and this material should be gathered in a heap for future use.²

It was ordinary usage for the sheep to be grazed on the common waste during the day and confined in the cote or fold for the night. A careful farmer would not let them out at once in the morning. He let them stand till they had voided, and thus conserved the manure in a place where it was to his hand, not dropped all over the common grazing. If he had an enclosed fallow field he was advised not to fold the sheep, but to put them into the enclosure. A few stakes driven into the ground here and there encouraged them to rub themselves, and the shepherd drove them about so that their droppings were scattered over the area.³

Every one agreed that this manure ought to be spread on the second ploughing. It was usual to give the corn land three ploughings during the fallow year, both for wheat and barley. If put on before the first stirring the manure would be buried too deep to do any good. After the first was the best time. The second ploughing would then bury the muck, and the third would mix it well with the top soil so that it would lie close to the seed after it was

¹ *De Re Rustica*, ii, 13.

² *Boke of Husbandry*, attrib. to Bishop Grossetete, printed by Wynken de Worde, 1510, reprinted in Francis Cripps-Day, *The Manor Farm*, 1931, chap. ix. Cf. I.B. (James Bellot), *The Book of Thrift*, 1589, *ibid.*

³ *Boke of Husbandry*, 1523, in *Certain ancient tracts concerning the management of landed property* reprinted, 1767, pp. 19, 20.

sown. The importance of placing the manure close to the seed was already recognized.¹

Fitzherbert realized that the ordinary farmer was often unable to accumulate sufficient dung to treat all his arable generously. If a man found himself in these circumstances the best thing to do was to plough down his ridges and make them where the draining furrow had been. Alternately he could make two ridges into one, or three into two. "And so shall he find new mould that was not seen in an hundred years before, the which must needs give more corne than the other did before."² He was a little optimistic. It was not improbable, as some discovered later, that this process would turn up the sterile subsoil, and reduce yields rather than increase them.

A more certain supplement to a farmer's supply of animal manure was vegetable waste compost. This had been recommended by the classical authors and the recommendation was repeated by contemporary writers. Whether it was at all generally followed is difficult to determine.

Cato informed his readers that it was possible to make manure of litter, lupine, straw, chaff, bean stalks, husks, and the leaves of ilex and oak. Columella advised farmers who could not keep livestock to collect leaves and rubbish from the hedgerows and droppings from the highways, and to cut fern from their neighbours' land. This material, with the sweepings of the courtyard, ashes, sewage from the house, and straw, was to be hoarded in a pit. Every waste thing ought to be swept into it. In the midst a piece of oak must be buried to prevent snakes lurking.³ This was good advice. Richard Surfleet recognized it and repeated it in 1600, even unto the piece of oak driven into the midst.⁴

The practice of mixing soil with animal excrement took special form in some areas. In Essex it was usual to plough up the headland, or to dig it up with spades, and throw it up in hillocks before the winter. Layers of dung were put upon each layer of earth, and the rain, snow, and frost rotted the whole down into a useful compost. The horseman was exhorted not to forget the heap. This material was thought very suitable for the barley crop which was extensively grown in East Anglia. If it was not done the headland was so much waste space.⁵ This system was known as windrowing, and was still used in the middle of the nineteenth century.

¹ Fitzherbert, *ibid.*, p. 18; *Surveying*, 1523, *ibid.*, p. 77; Thomas Tusser, *Five Hundred Points of Good Husbandry*, 1577, ed. by William Mavor, 1812, pp. 106, 155, 174, 180; James Bellot, *op. cit.*, 1589; Anon, *God speed the plough*, 1601, ed. with an introduction by J. Christian Bay, 1953. ² *Surveying*, *op. cit.*, p. 78.

³ Cato, *De Agricultura*, xxxvii; Columella, ii, 14; Varro, trans. by Lloyd Starr-Best, 1912, p. 82. ⁴ Richard Surfleet, *Maison Rustique or the Country Ferme*, 1600, p. 67.

⁵ Tusser, *op. cit.*, pp. 51, 52, 101.

On the opposite side of the country Cornish farmers made the mixture with sand from the seashore. This was doubtless more profitable because the sand, mixed with shells, was highly calcareous. They called the process making their sand ridge. William Carnsew of Bokelly did it in June. He built up a large pile of sand, and towards the end of the month added thirty loads of dung a day.¹ It is probable that he added sand in layers as the Essex men did in windrowing, although he does not specifically say so.

Farmers who lived within a dozen miles or so of the coast, particularly in the south-west, habitually collected sea sand for use as a fertilizer. Often it was used unmixed, but no doubt some dung was also spread so that the two were added to the soil, though not in such a well mingled condition as if made into a sand ridge. Pure sea sand was spread on the soil by Cornish farmers at the rate of sixty sacks an acre, two of which made a horse load. Many doubled that number. Those who lived further inland on better soil were content to sow sand almost as thin as their corn.²

In the south-western counties and in other parts of the country where convertible husbandry was practised, the matted grass was cut off in turves when the ley was broken up. The turf was pared off with a mattock or with a breast plough, and piled on the edge in heaps to dry. When thoroughly dry the turves were burned into ash. This practice, being very common in Devonshire, was known as 'denshiring'.

In Cornwall the heaps of ash were mixed with sand heaps and the whole ploughed into the land,³ but the farmers of more inland counties, like Surrey and Shropshire, simply spread the ash and ploughed it in before sowing a crop of rye or oats.⁴

Earth dug out from the ditches and ponds, road scrapings—on the dirt tracks of the day these were a mixture of soil and animal droppings—household dirt, and the ashes of wood fires were all materials that the careful farmer added to his manure heap. Much of this material, especially the calcareous 'creech' derived from the shelly river beds of East Anglia, contained valuable plant nutrients, though the farmers who used them would have been at a loss to say what they were.

All this, coupled with the advice handed down from classical times, suggests that it may have been usual to add leaves and other vegetable waste to

¹ A. L. Rowse, *The Age of Elizabeth*, 1950, p. 103.

² Hugh Plat, *The Jewel House of Art and Nature*, 1594, p. 42; Richard Carew of Antony, *The Survey of Cornwall*, 1602, ed. by F. E. Halliday, 1953, p. 102.

³ Carew, *op. cit.*, p. 82.

⁴ John Norden, *The Surveyor's Dialogue*, 1607, pp. 202, 227; Ernle, *English Farming Past and Present*, 1932, p. 107.

the dung or compost hills in the manner of which Sir Albert Howard was so strong a modern protagonist. At least one gentleman was in the habit of doing this. Barnaby Googe, a Lincolnshire squire, customarily threw twigs, boughs, and straw on the manure heap to help it out.¹ He can hardly have been the only farmer to do so.

Fitzherbert mournfully remarked that he had observed many disused marl pits in open fields. None of the open-field farmers bothered to dig marl and spread it in the early years of the sixteenth century, so far as he could judge. There was a very good and sufficient reason for this. The tenants would not improve their land by this process because they feared that their landlords would demand higher rents. They were not lazy or ignorant, merely prudent. Fitzherbert was convinced that marling well done would keep the soil fertile for twenty years.²

The practice was certainly resumed, if it had ever been completely interrupted, by the end of the sixteenth century, though it may not have been done on the old arable of the open fields. It was probably done more readily on land ploughed out for a few years' cropping and returned to ley, in those counties where the convertible husbandry was usual. Farmers in such widely separated places as Lancashire, Cheshire, Salop, Somerset, Middlesex, Sussex, and Surrey marled their land.³

Gervase Markham was a real enthusiast for using marl. He recalled Pliny's statement that the Britons used marl and that it was mentioned in books of gainage or husbandry written in the days of Edward II, as well as by Walter of Henley. Markham himself describes how it was used by Kentish farmers when bringing areas of Wealden land into cultivation. The quantity of marl used varied widely on different soils—as was wise. Marl was not, he said, good upon clay land. Since the purpose of marling was to improve the texture of light land, this is readily comprehensible. On sandy or hazelly land five hundred cartloads, containing from ten to twelve bushels each, could be usefully spread. The Kentish acre was 160 rods of 16 feet. After applying the marl, this land might be ploughed and wheat sown, but some farmers broke up the grassland and took a crop of oats. After this they spread the marl and sowed wheat. Land treated in this way must not be harrowed down fine. Only one or two crops were taken, and then it was let fall down to grass for five or six years. Markham rather optimistically said that "all this time it will beare a very good and sweet Pasture, well set with a white Clover, or three leaved grasse, most fatning and profitable, both for Sheepe and Bullocks." When the appropriate time had passed the ley was broken up again

¹ Barnaby Googe, *The whole art and trade of husbandry*, 1614, p. 12.

² *Surveying*, *op. cit.*, p. 82.

³ John Norden, *op. cit.*, p. 227.

for two or three years' crops. Under this system the effects of marling could be enjoyed for some thirty years, but if too many successive crops were sown it would be exhausted in five years.

Four sorts of marl were found in the Weald, distinguished by their colours, grey, blue, yellow, and red. Their order of merit was blue, yellow, grey, and red. All were good material if as slippery as soap.¹

Little definite can be learned about the use of chalk, but it was probably used in the compost heaps, if not otherwise. In chalky soils the material dug to mix with dung doubtless contained a mixture of chalk. It may, too, have been used by itself as a fertilizer. Barnaby Googe warned his readers about it. "In some countries," he wrote, "they make their land very fruitful with laying on of a Chalke. . . But long use of it in the end, brings the ground to be starke nought, whereby the common people have a speech, that ground enriched with Chalke makes a rich Father and a beggerly Sonne."²

It is clear that by the end of the sixteenth century lime was burned in some parts of the country and used much in the same way as marl. Markham held the opinion that sandy soil marled, limed, chalked, and manured would yield good crops of wheat or rye for three years, barley for one year, and oats for the following three years. After that it would grow excellent lupines for a season and then good meadow or pasture.³ Walter Blith, at a little later date, supported him. Lime could be applied at twelve to fourteen quarters an acre, or a mixture of lime, soil, and manure applied. From three to five crops could then be taken. The last crop must be well dunged and laid down to grass on the wheat or rye stubble. This dressing was only good for light and sandy lands, and should not be applied to cold wet gravel or hungry clay.⁴

This was no doubt a well established method by 1600. Norden is quite explicit and names the counties where it was the practice. "In *Shropshire*, *Denbighshire*, *Flintshire* and now lately in some parts of *Sussex* they fetch limestone, erect kilns, and burn it on their own farms. . . On the south-east coast from *Rye* to *Suffolk* they burn pebbles for the same purpose."⁵

The use of fertilizers other than dung, dung and soil mixed, or household waste and vegetable waste in a compost heap, was largely confined to places outside the open-field area. All round the coast calcareous sand and seashells and seaweed were collected. In the *Marcher* counties of the west midlands, and in *Sussex*, lime was burned. Along the coast calcareous pebbles were

¹ Gervase Markham, *Inrichment of the Weald of Kent*, 1625, *passim*; cf. *Markham's Farewell to Husbandry*, 1638.

² Googe, *op. cit.*, p. 19 v.

³ *Farewell to Husbandry*, 1638, p. 36.

⁴ Walter Blith, *The English Improver Improved*, 3rd ed., 1653, pp. 134, 135.

⁵ Norden, *op. cit.*, p. 227.

used in the same way by the end of the sixteenth century. Marl was used in bringing the forest land of the Weald and elsewhere into cultivation. It may perhaps be said that the most advanced systems of fertilization were practised away from the open fields, where farming was restricted by common regulation, although Robert Loder of Harwell, Berks, experimented with the use of malt dust and black ashes on his open-field farm there between 1610 and 1620.¹ Farmers working on the convertible system, now known as the ley husbandry, cultivated the land under more elastic conditions, and could therefore adopt new ideas with a certainty of reaping the advantage themselves. Knowing this, they were more ready to try novelties, and it was they who returned to the use of marl and lime most quickly—that is, if the use of these materials had ever been intermitted.

Orchards were part of many farms, but it was not thought possible to lay up sufficient manure to treat the whole area upon which fruit trees were grown. If a stubborn man was determined to do it all, then he must have a larger supply of dung. A trench was dug in the lower end of the orchard and filled with good, short, hot, and tender muck. Similar trenches were dug and filled all across the area, but few farmers could have enough dung to do all this. A better method was to dig circular pits and fill each with fat, pure, and mellow earth. In these pits the trees were planted.²

Hops were a comparatively new crop in England though cultivated in widely dispersed parts of the country, Yorkshire, Essex, Kent, and Cornwall for example. Rotten stall dung was considered the best dung for this crop. The hop grower was strongly advised to use none at all rather than new horse dung which was very pernicious. All the available dung must be kept until it was rotten before use.³ Dove dung from the pigeon cote was another good fertilizer for hops and ought to be carefully preserved.⁴ Some growers laid fern on the hills, and malt dust was used if the grower's farm was near a malting town.⁵

Besides being used for hops, pigeon's dung was valued for other purposes. It was a useful addition to other supplies of animal excreta, but supplies must always have been small. The largest dovecote can hardly have produced enough of this material to fertilize more than an acre or two. Its scarcity made it precious. Gabriel Plattes roundly declared that he had known a load of

¹ Robert Loder's *Farm Accounts*, 1610–1620, Camden Soc., 3rd Series, III, 1936, pp. 43, 59, 135, 136.

² William Lawson, *A New Orchard and Garden*, 1618, ed. Eleanour Sinclair Rohde, 1927, pp. 3, 4.

³ Leonard Mascall, *A booke of the Arte and Maner how to Plant and Graffe all sorts of Trees...* 1572; Reginald Scott, *A Perfite Platforme of a Hoppe Garden*, 1574, p. 33.

⁴ Tusser, *op. cit.*, p. 87. ⁵ Hugh Plat, *op. cit.*, pp. 48, 49.

pigeon dung fetched sixteen miles, and a load of coal given for it, a story that sounds too good to be true. He estimated that the effect on the land was worth double the charges.¹

Most farmers collected fertilizer and made compost heaps in order to enrich their arable land. Some small portion may have been saved for spreading on enclosed meadows or pasture, but there was little to spare for this purpose. Hay meadows were usually the low-lying land on the banks of some river, stream, or brook. Farmers would have been foolish indeed if they had not observed the richness of riparian grassland that was occasionally flooded when the rivers overflowed their banks. Towards the end of the sixteenth century some English farmers set out to regulate the floodings. They constructed water meadows, some of which are still used.²

The process was to cut channels across the land and stop the river or stream so that the water could be diverted. When it had filled the channels, stops in them caused it to flood the land. The flood water was retained for a suitable time until whatever solid material it carried was deposited and then it was drained off, the hatch in the river being opened so that the whole of the river waters resumed their ordinary course. Besides the good meadow that was improved by this means, marshy and boggy land adjacent to streams could be treated. The channels drained it and the aquatic grasses, rushes, and so on, gave place to a more nutritious herbage. Some few farmers used grass seed from the haymow to sow in these meadows, but it was not really necessary to seed down. The flooding induced the growth of grass most suited to the meadow, to the exclusion of other types.

Fitzherbert recommended the process if there was any stream that could be diverted to flood the meadows from after haysel until early May. The water must flow over the ground. It should not be allowed to lie stagnant. Of course it drowned the moles. If the stream came out of a town and was consequently polluted with sewage, and drained middens and dunghills, so much the better. From May onwards the water must be kept off the land.³ This is a clear anticipation of the process later elaborated, if it is not a description, of what Fitzherbert had seen in practice.

It is generally accepted, despite Fitzherbert, that the earliest water meadows in England were made in the Golden Vale of Hereford and in the

¹ Gabriel Plattes, *A Discovery of Infinite Treasure*, 1639, p. 26.

² See E. H. Carrier, *The Pastoral Heritage of Britain*, 1936: "such irrigated or water meadows are found on the hill slopes of East Yorkshire, in the Dove Valley in Derbyshire, and along the rivers Kennet, Churn, Severn, Avon, Itchen, and Test." Some of these may now be derelict.

³ *Surveying*, 1523, f. 42v. Cf. W. Folkingham. *Feudigraphia*, 1610, p. 33; Norden, *op. cit.*, pp. 199, 200, 205-6; Surfleet, *op. cit.*, p. 670.

Wylde Valley in Wiltshire. They were constructed in the late sixteenth or early seventeenth century. Rowland Vaughan was the pioneer in Hereford; the name of the Wiltshire innovator is lost to us.¹ Norden had seen many water meadows in Somerset, Devon, and Cornwall when he wrote his book in 1607.² He regretted that the system was not generally used elsewhere, though it could be equally advantageous. The water is said to add fatness to the land.

Fatness was the essential principle of fertility. Vergil had extolled it. If a soil was naturally fat it was naturally fertile, if it was not then it must be made fat by the addition of manure. A naturally fat soil could be recognized by one or two simple tests or by its ecology. One method was to sprinkle a clod with water and rub it through the fingers. If it was clammy and stuck to the fingers like pitch, it was a fat fertile earth. Another method was to dig a furrow and fill it up again. If it then gaped and was open, the soil was lean and slender. If it reached out it was fat ground. What this precisely means is difficult to decide. If the natural ecology consisted of elm, sloe, bullace, or crab apple, the soil was fruitful, and where bulrushes, thistles, three-leaved grass, brambles, and blackthorn grew, corn could be grown.³

The relative value of the dung of the different species of livestock in crop nutrition was not precisely agreed upon by the different teachers, though so much of what they said was taken direct from classical sources. Hyll thought asses' dung was the best because it contained the least weed seeds. Other kinds should be used when not more than a year old. If kept long they lost some of their strength, an accurate observation. He disliked swine's dung. It was "most oyle." Ashes were good on the garden.⁴

Other people believed that pigeons' or poultry's dung was the richest in plant food. Next was human ordure, though that ought to be mixed with other rubbish of the house. Last was cattle droppings. This advice was that of Varro and Columella.⁵

Tudor and early Stuart scientists and those of much later days looked for one general principle that was the stimulant of plant growth. Much of their thinking was confused by the theories of the alchemists, and because their

¹ Rowland Vaughan. *His Boke published* 1610, ed. Ellen Beatrice Wood, 1897, *passim*. John Aubrey, *The Natural History of Wiltshire*, 1635, ed. J. Britton, 1847, p. 104.

² Norden, *op. cit.*, p. 198. The subject has been discussed in some detail by Eric Kerridge, 'The Floating of the Wiltshire Water Meadows', *Wiltshire Archaeological and Nat. Hist. Magazine*, LV, 1953, pp. 105-18.

³ Thomas Hyll, *A most high and pleasant Treatyse teachyng how to garden . . .* 1563, ed. Violet and Hal Trovillion, 1946, p. 15; B. Googe, *Foure Bookes of Husbandry*, 1577, p. 18.

⁴ *Ibid.*, p. 26; cf. Googe, *Foure Bookes* . . . , p. 190.

⁵ Googe, *ibid.*; Surfleet, *op. cit.*, p. 671.

enquiries lacked direction. The farmers were quite unable to formulate the problems that confronted them, and could not describe to the scientists the nature of the questions that required answers. Even had they been able to do so the scientists' belief that there was only one principle to be considered, a miraculous salt that would do all things, would have clouded the issue. Bacon himself subscribed to this theory.

All excrements contained this vegetable salt and served to fatten and enrich the soil. It made all seeds flourish and grow. It was the result of the putrefaction of the hay and straw in the dung, and if the dunghill was left uncovered that valuable nutrient leached out. The fallow gathered saltiness from the clouds and rain. It was not common salt but vegetable salt. Few men understood that this was the true reason why dung was good in arable ground, said Sir Hugh Plat.¹

This salt was the nitre that then played so large a part in the chemist's laboratory. No mineral plant or animal could subsist without it. "The whole scientific world extolled in extravagant terms the virtues of a compound the true nature of which it had yet failed to grasp."²

Bacon set out many theories, some quite fantastic, others very near the mark. If vegetation were allowed to die into ground it would, he believed, fatten it, i.e. make it more fertile. He therefore suggested that peas' haulm should be ploughed in. It would, of course, increase the humus in the surface soil. Like others, he was aware that the plant nutrients would leach out of manure if exposed too long to the weather. He thought earth containing saltpetre the finest possible manure. It could be bred by covering in a piece of earth with a hovel or merely laying out some planks. Saltpetre was the same thing as nitre. Marl was high in the list of valuable manures because it contained so much fatness.

Bacon made many experiments to test his theories. He made a hot bed of old well-rotted horse dung and tested the germination of various seeds in it. The seed had previously been steeped all night in water mixed with cow dung. He made various other steeps with other kinds of dung, with ashes, salt, and wine. He watered strawberries with these diluents at intervals of three days, and found they came early.³

Only a few years later three gentlemen took out a patent for a process of steeping seed in rape oil, at the rate of a quart to a Winchester bushel, to promote germination. The soaked seed was treated with a powder consisting

¹ Sir Hugh Plat, *Diverse new sorts of soyle not yet brought into any public use for manuring* . . . 1594, pp. 11, 14, 15.

² Russell M. Garnier, *History of the English Landed Interest*, 1893, II, pp. 287, 288.

³ Francis Bacon, *Sylva Sylvarum, or a Natural History in Ten Centuries*, 1627, pp. 109-51.

of one quart of beans malted, one quart of powdered rape seed cake, and one quart of new lime fresh from the kiln, quenched with urine, and sifted as much as would cover the seed. The powder could also be used as manure on poor ground at about two bushels an acre. Alternative constituents were given in case these things were not available. The idea seems to have been based upon the recent spread of rape culture in many districts, but how widely it was ever adopted, if at all, is to seek.¹

Gabriel Plattes, at the end of the period, set out his theory that there was a double fatness in every compound body, one combustible, and one incombustible. The combustible fatness caused vegetation by its rarefying and vapouring quality when it felt the heat of the sun; the incombustible caused coagulation; of these two fatnesses all riches and treasures were engendered. This theory was stated as one version of the attempt to discover a 'principle' of vegetation that continued throughout the seventeenth and much of the eighteenth centuries. Plattes's fatness was similar to the *magma unguinosum* of Külbel. Plattes admitted that he knew very little, but felt that his glimmering light was better than none at all. The composition of the different kinds of dung varied according to the proportion of the incombustible astringent it contained. Experiment was necessary to determine what was best for the different soil types. Nothing would however increase unless the two fatnesses were mixed. He repeated the warning that the combustible fatness would grow soft, rarefy, and turn into vapour by the heat of the sun. On the practical side he followed the ancient ways, but made some suggestions for steeping seed and dusting it with powdered lime before sowing. He was convinced that the common way of husbandry led to nothing but poverty and barrenness.²

Farmers of this period, both high and low, had one main worry, manure. They could never neglect one source of supply however small, for every crop they grew depended upon the amount available. They were willing to undertake the labours of Hercules to build up a sufficient dunghill or compost heap.

Practical farmers were willing then, as now, to try novel ideas, though the majority were doubtless fond of the usual methods, and likely to stick to what was known to be safe. It is not too much to say that within the limits of the fertilizing material available practice was as effective as supplies would allow. The proof of this is that the national average yield of corn crops was steadily rising. It had been no more than from six to twelve bushels an acre on the best farms that Walter of Henley knew. The ordinary Elizabethan

¹ Anon, *A direction to the husbandman in a new cheepe and easy way of fertilizing and enriching arable ground*, 1634.

² Gabriel Plattes, *A Discovery of Infinite Treasure*, 1639, *passim*. Cf. Edward J. (now Sir John) Russell, *Soil Conditions and Plant Growth*, 3rd ed., 1917, pp. 1-4.

farmer would have been disappointed with less than sixteen bushels in a reasonably good year, and sometimes got much more.¹ This increment of yield had been obtained by following an intelligent empiricism. The time of theory supporting practice was not yet. Science was hampered by its nexus with alchemy, and its concern with the search for the philosopher's stone and other fantasies. Only when the didactic writers began to suggest that experiment should determine what was the best material to be used for a particular purpose did agricultural chemistry come to birth. The suggestions, rather fantastic, made by Sir Hugh Plat, Bacon, and Gabriel Plattes were the labour pains of modern bio-chemistry.

¹ *Walter of Henley's Husbandry*, ed. Lamond and Cunningham, 1890; *Robert Loder's Farm Accounts*, Table 10; Robert Trow-Smith, *English Husbandry*, 1951, pp. 105, 106.

Notes and Comments

THE BRITISH AGRICULTURAL HISTORY SOCIETY

The third Conference and Annual General Meeting of the Society was held at Somerville College, Oxford, from the evening of Thursday, 14, to the afternoon of Friday, 15 April. It was attended by about forty-four members of the Society. The Conference began on the Thursday evening with an illustrated lecture by Dr Arthur Raistrick, Reader in Economic Geology in the University of Durham, on his work on the Kilnsey Grange of Fountains Abbey. This was an open lecture and attracted a number of Oxford people who were not members of the Society. There were three papers on the Friday, the first by Dr Colin Cooke, Bursar of Magdalen College, who spoke on the college estates. The second was by Dr Rodney Hilton, of the School of History at Birmingham University, on Agrarian History in Medieval Warwickshire, and the third was by Dr Stella Davies on Cheshire Farming, 1750-1850.

The chair at the Annual General Meeting was taken by Mr Alexander Hay as the President, Sir James Scott Watson, was unfor-

tunately unable to be present. The retiring officers were re-elected, and Mr V. Bonham-Carter, Mr G. Houston, and Mr W. Harwood Long were elected to the Executive Committee in the place of Dr Joan Thirsk, Mr G. Ordish, and Mr Stuart Maxwell, who retired under Section 8 of the Constitution.

In presenting the report of the Executive Committee, the Chairman said that the Society had had an encouraging year. Membership had risen steadily and was still rising, and the Executive Committee had decided that it would in future be possible to publish two issues of the journal each year. Volume III Part II of the *Review* would therefore appear in the autumn. The Executive Committee had also decided that the time had come when the *Review* could be sold to non-members for the sum of twelve shillings and sixpence per copy. There would also in future be a Library Subscription of one guinea.

THE REVIEW

In accordance with the suggestion aired in our last issue, we publish in this second

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